

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 19460T	FOR FURTHER ACTION See Form PCT/IPEA/416	
International application No. PCT/FI2004/000455	International filing date (<i>day/month/year</i>) 15.07.2004	Priority date (<i>day/month/year</i>) 31.07.2003
International Patent Classification (IPC) or national classification and IPC C22B19/26		
Applicant Outokumpu OYJ et al		

1.	This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2.	This REPORT consists of a total of <u> 3 </u> sheets, including this cover sheet.
3.	This report is also accompanied by ANNEXES, comprising: <div style="margin-left: 20px;"> <div style="display: flex; align-items: flex-start;"> <div style="margin-right: 10px;">a. <input checked="" type="checkbox"/></div> <div> <p>(<i>sent to the applicant and to the International Bureau</i>) a total of <u> 3 </u> sheets, as follows:</p> <div style="margin-left: 20px;"> <input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions). <input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box. </div> </div> </div> <div style="margin-left: 20px; margin-top: 10px;"> <div style="display: flex; align-items: flex-start;"> <div style="margin-right: 10px;">b. <input type="checkbox"/></div> <div> <p>(<i>sent to the International Bureau only</i>) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p> </div> </div> </div> </div>
4.	This report contains indications relating to the following items: <div style="margin-left: 20px;"> <div style="display: flex; align-items: flex-start;"> <div style="margin-right: 10px;"><input checked="" type="checkbox"/></div> <div>Box No. I Basis of the report</div> </div> <div style="display: flex; align-items: flex-start; margin-top: 5px;"> <div style="margin-right: 10px;"><input type="checkbox"/></div> <div>Box No. II Priority</div> </div> <div style="display: flex; align-items: flex-start; margin-top: 5px;"> <div style="margin-right: 10px;"><input type="checkbox"/></div> <div>Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</div> </div> <div style="display: flex; align-items: flex-start; margin-top: 5px;"> <div style="margin-right: 10px;"><input type="checkbox"/></div> <div>Box No. IV Lack of unity of invention</div> </div> <div style="display: flex; align-items: flex-start; margin-top: 5px;"> <div style="margin-right: 10px;"><input checked="" type="checkbox"/></div> <div>Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</div> </div> <div style="display: flex; align-items: flex-start; margin-top: 5px;"> <div style="margin-right: 10px;"><input type="checkbox"/></div> <div>Box No. VI Certain documents cited</div> </div> <div style="display: flex; align-items: flex-start; margin-top: 5px;"> <div style="margin-right: 10px;"><input type="checkbox"/></div> <div>Box No. VII Certain defects in the international application</div> </div> <div style="display: flex; align-items: flex-start; margin-top: 5px;"> <div style="margin-right: 10px;"><input type="checkbox"/></div> <div>Box No. VIII Certain observations on the international application</div> </div> </div>

Date of submission of the demand 16.05.2005	Date of completion of this report 25.10.2005
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. +46 8 667 72 88	Authorized officer Mårten Hulthén/Els Telephone No. +46 8 782 25 00

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/FI2004/000455

Box No. I Basis of the report

1. With regard to the language, this report is based on:

- ☒ the international application in the language in which it was filed
- ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of:
- ☐ international search (Rules 12.3(a) and 23.1(b))
- ☐ publication of the international application (Rule 12.4(a))
- ☐ international preliminary examination (Rules 55.2(a) and/or 55.3(a))

2. With regard to the elements of the international application, this report is based on (replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):

- ☐ the international application as originally filed/furnished
- ☒ the description:
- pages 1 - 13 as originally filed/furnished
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____
- ☒ the claims:
- pages _____ as originally filed/furnished
- pages* _____ as amended (together with any statement) under Article 19
- pages* 14 - 16 received by this Authority on 16.5-2005
- pages* _____ received by this Authority on _____
- ☒ the drawings:
- pages 1 - 2 as originally filed/furnished
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____
- ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (specify): _____
- ☐ any table(s) related to the sequence listing (specify): _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (specify): _____
- ☐ any table(s) related to the sequence listing (specify): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/FI2004/000455

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	<u>1-17</u>	YES
	Claims		NO
Inventive step (IS)	Claims	<u>1-17</u>	YES
	Claims		NO
Industrial applicability (IA)	Claims	<u>1-17</u>	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

Amended claims 1-17 have been filed on 16 May 2005.

Document considered as being of particular relevance.

D1 US 4917775

The invention relates to controlling the removal of metals, such as cobalt, nickel, copper, germanium and cadmium, in conjunction with zinc preparation. The redox potential is measured in order to optimise metal removal. In order to minimise measurement errors, the measurement electrodes are repeatedly cleaned during the process.

D1 (e.g. example 2) discloses a method for using electrochemical redox potential measurements in a process for treating valuable materials like zinc. D1 reveals specifically the removal of cobalt from a zinc solution. The measurement electrodes are cleaned before measuring. The amount of zinc powder added to the process can be reduced substantially. The measurements are performed in a measuring cell (figures 2-3, detail 12). It is not clear from D1 whether the measurements are performed outside or inside the reactor. The method of claim 1 and the apparatus of claim 12 of the application differ, however, from D1 in that the acidity and/or basicity are determined "by means of the BT value".

According to the applicant, the BT value is considered to describe the status of the process more accurately than the pH value and enables one to perform more accurate determinations. It is considered that the stated difference implies improvements for example as to introducing the correct amount of zinc powder into the process.

The invention as defined in claims 1-17 is considered to involve an inventive step and also to fulfil the criteria of industrial applicability.

CLAIMS

1. A method for controlling a continuous metal removal in conjunction with a zinc preparation process, in which the metal removal is performed in
5 one or more reactors, in conjunction with the reactor, the redox potential and the acidity and/or basicity are measured, and the process variables of the metal removal are adjusted towards the desired direction
based on the measurement results,
10 characterised in that the measurements of the redox potential are performed from the sludge produced in the reactor outside the reactor vessel, and the acidity and/or basicity of the reactor solution is determined by means of the BT value, and
15 the measuring instrument of the redox potential is purified at predetermined intervals.

2. The method as defined in claim 1, characterised in that the solid matter content of the reactor solution is determined and
20 adjusted to be suitable.

3. The method as defined in claim 1 or 2, characterised in that based on the measurement results, the introduction of zinc powder into the metal removal reactor is adjusted.

25 4. The method as defined in any one of claims 1-3, characterised in that based on the measurement results, the redox potential of the sludge, the acidity/basicity of the solution, the solid matter content of the solution and/or the
30 temperature of the reactor are adjusted.

5. The method as defined in any one of claims 1-4, characterised in that the metal removal is performed at least in two reactors connected in serial.

35 6. The method as defined in any one of claims 1-5, characterised in that the measuring instrument of the redox potential is arranged in

conjunction with the outlet pipe of the reactor or in conjunction with the connecting pipe between the reactors.

7. The method as defined in any one of claims
5 1-6, characterised in that the measuring instrument of acidity and/or basicity is arranged in conjunction with the reactor vessel.

8. The method as defined in any one of claims
1-7, characterised in that the measurement
10 of the redox potential is performed using a measurement electrode.

9. The method as defined in any one of claims
1-8, characterised in that the metal removal is cobalt removal.

10. The method as defined in any one of
15 claims 1-9, characterised in that the measuring instrument is regularly washed, preferably at intervals of 1-2 hours.

11. The method as defined in any one of
20 claims 1-10, characterised in that in conjunction with each reactor, measurements are performed that control the adjustment of the desired process variable, for each reactor specifically.

12. An apparatus for controlling a continuous
25 metal removal in conjunction with a zinc preparation process, in which the metal removal is performed in one or more reactors (11a-c), the apparatus comprising at least one measuring instrument (16a-c) for measuring the redox potential and acidity and/or
30 basicity in conjunction with the reactor, at least one adjustment device (17a-c) for adjusting the process variables of the metal removal towards the desired direction based on the measurement results, and at least one control device for forwarding the
35 measurement results from the measuring instrument (16a-c) to the adjustment device (17a-c), characterised in that the measuring

16-05-2005

16

instrument of the redox potential (16a-c) is arranged outside the reactor vessel, and is placed in conjunction with the pipe connected to the reactor, via which pipe the sludge produced in the reactor
5 flows out, and the apparatus comprises a determination device of BT value for determining the acidity and/or basicity of the reactor solution, and the apparatus comprises purification means for purifying the measuring instrument of the redox potential at
10 predetermined intervals.

13. The apparatus as defined in claim 12, characterised in that the apparatus comprises a feeding device (17a-c) for introducing zinc powder into the metal removal reactor (11a-c),
15 and the feeding device is connected to the adjustment and/or control device.

14. The apparatus as defined in claim 12 or 13, characterised in that the measuring instrument (16a-c) of the redox potential is arranged
20 in conjunction with the connecting pipe between the reactors.

15. The apparatus as defined in any one of claims 12-14, characterised in that the measuring instrument of acidity and/or basicity is
25 arranged in conjunction with the reactor vessel.

16. The apparatus as defined in any one of claims 12-15, characterised in that the measuring instrument (16a-c) of the redox potential comprises at least one measurement electrode.

30 17. The use of an apparatus as defined in any one of claims 12-16 in a cobalt removing process.